

Shape the Future

The Benefits of Digital Inclusion - Arizona

8/9/2012

For additional information, contact Dan MacFetridge danmac@microsoft.com

Disclaimer: *This economic model is meant to be used to estimate the potential economic benefits of digital inclusion. This tool utilizes publically available research and data related to digital inclusion, graduation rates, income differences and government program costs. Although the model utilizes research that show statistical significant results, the results of the model does not take into consideration current educational, general economic and budgetary situations. It is not intended to predict or guarantee the economic benefits due to digital investments (e.g. this tool should only be used as a reference, and not as a calculator for future revenue or cost reduction of government programs).*

Note: *This is not a white paper for Digital Inclusion, but an output document for the Digital Inclusion economic model*

Table of Contents

Executive Summary	3
Model Overview	4
Digital Inclusion Concept Overview	5
Target Demographic	6
Lifetime Benefits	7
Sample Return on Investment	8
Job Creation	9
Appendix	
Digital Inclusion Concept Details	11
Model Logic	12
Key Parameter Values	13
Increase in Wage Earnings	14
Increase in Tax Revenue	15
Savings on Social Programs	16
Savings on Prison Cost	17
Savings on Health Care Programs	18
Gov't Admin Savings via e-Gov	19
Data and Sources	
Bibliography and Source Data for Model	21

Executive Summary - Arizona

People below poverty
(<\$22,162 for family of 4): 980,543
School aged children below poverty: 242,103

Year	2011
Arizona:	6,420,893
Below Poverty	980,543
<5	117,919
5-17	242,103
18-64	550,670
+65	69,852
Above Poverty	5,440,350
<5	360,647
5-17	946,988
18-64	3,338,611
+65	794,103

Solution Approach
All Households

All Households	783,831
Total PC Investments	783,831

students

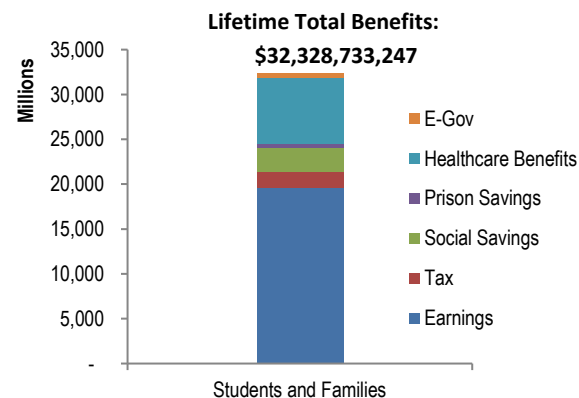
Net New Jobs Created
1,201

Lifetime unemployment rate reduction (5-17)
0.2%

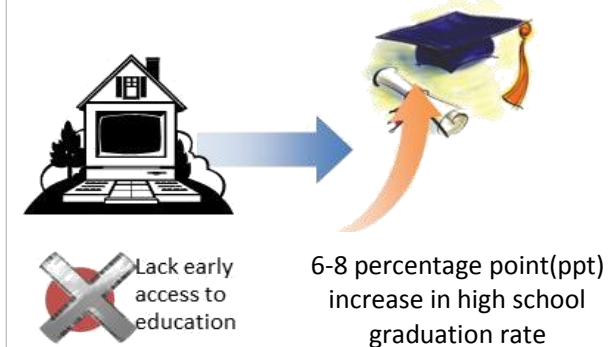
Due to this economic disadvantage, they are at the greatest risk of dropping out of high school, becoming disengaged in society, and reinforcing their economic predicament



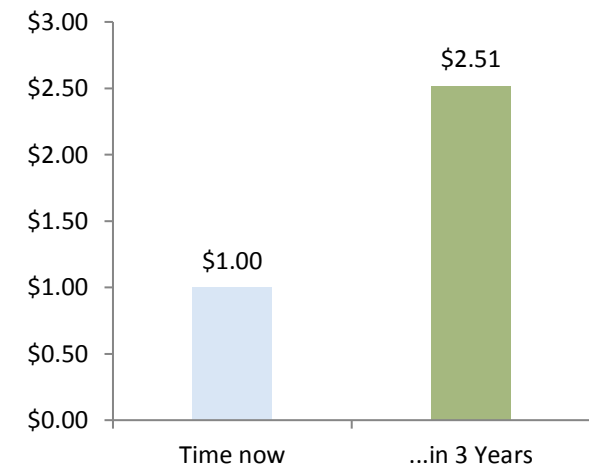
This translates into multiple benefits including: significant increase in lifetime earnings, tax revenues for the gov't, reduced dependency on social and health care programs, reduced chances of incarceration, and increased efficiencies and reduced cost in gov't services



By providing students and their families with a PC and broadband internet access, it reduces the hurdle of early access to education, improves their engagement at school and with society, and also increases their chance of graduating high school and going on to college



The total return on the investment is significant and justifies the effort and upfront costs



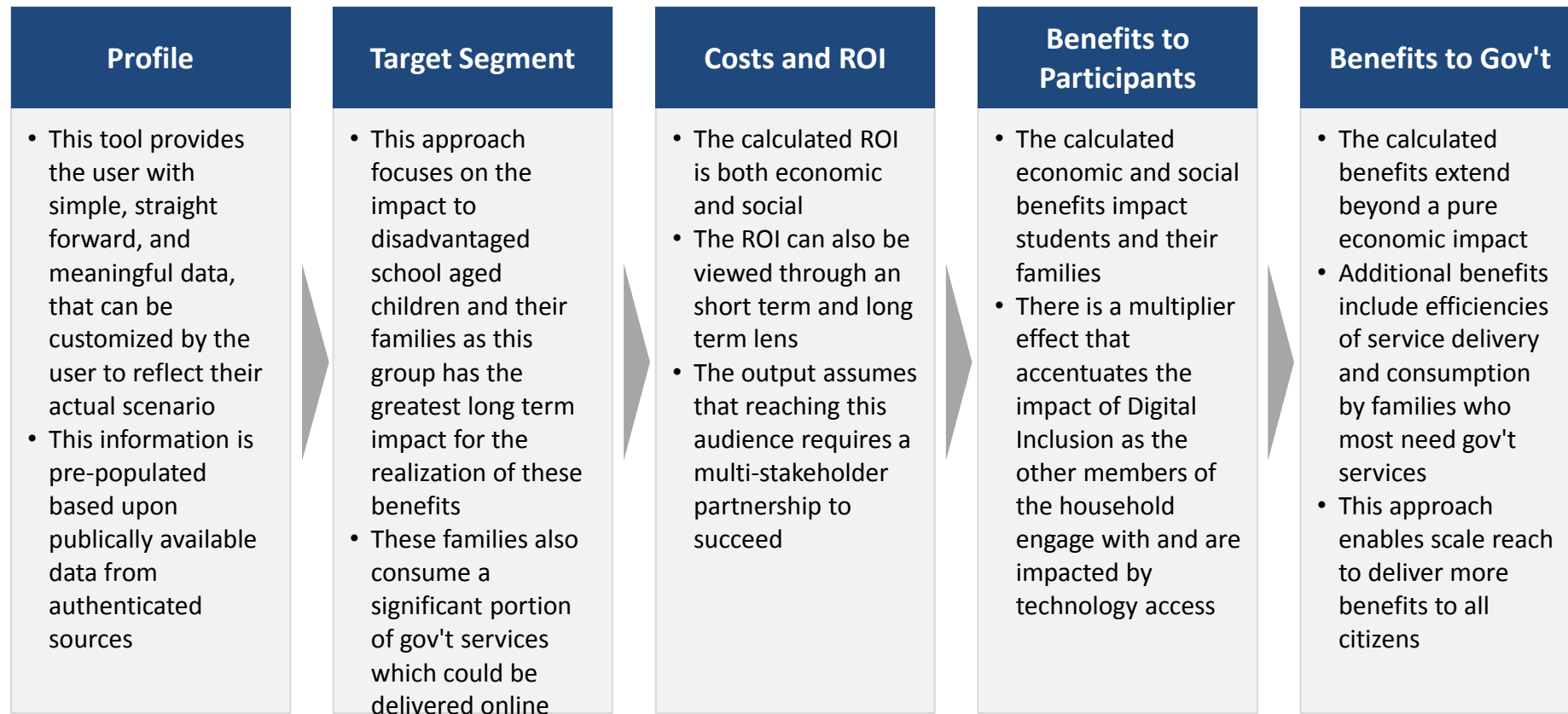
Model results based on assumptions presented in Key Parameter Values

Date: 8/9/2012

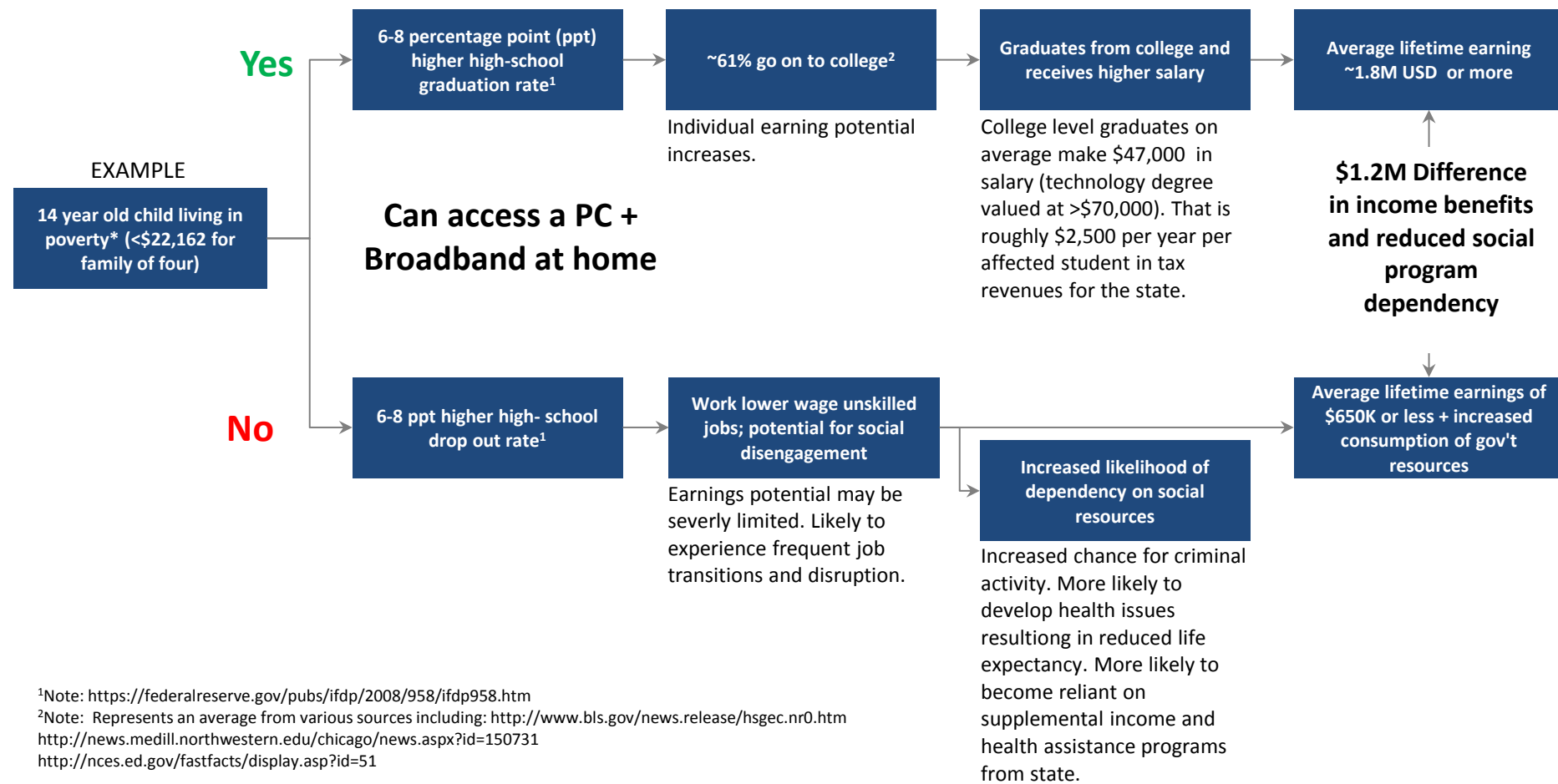
Note: Tax benefits include income, sales, and property taxes as applicable

Disclaimer: This economic model is meant to be used to estimate the potential economic benefits of digital inclusion. This tool utilizes publically available research and data related to digital inclusion, graduation rates, income differences and government program costs. Although the model utilizes research that show statistical significant results, the results of the model does not take into consideration current educational, general economic and budgetary situations. It is not intended to predict or guarantee the economic benefits due to digital investments (e.g. this tool should only be used as a reference, and not as a calculator for future revenue or cost reduction of government programs).

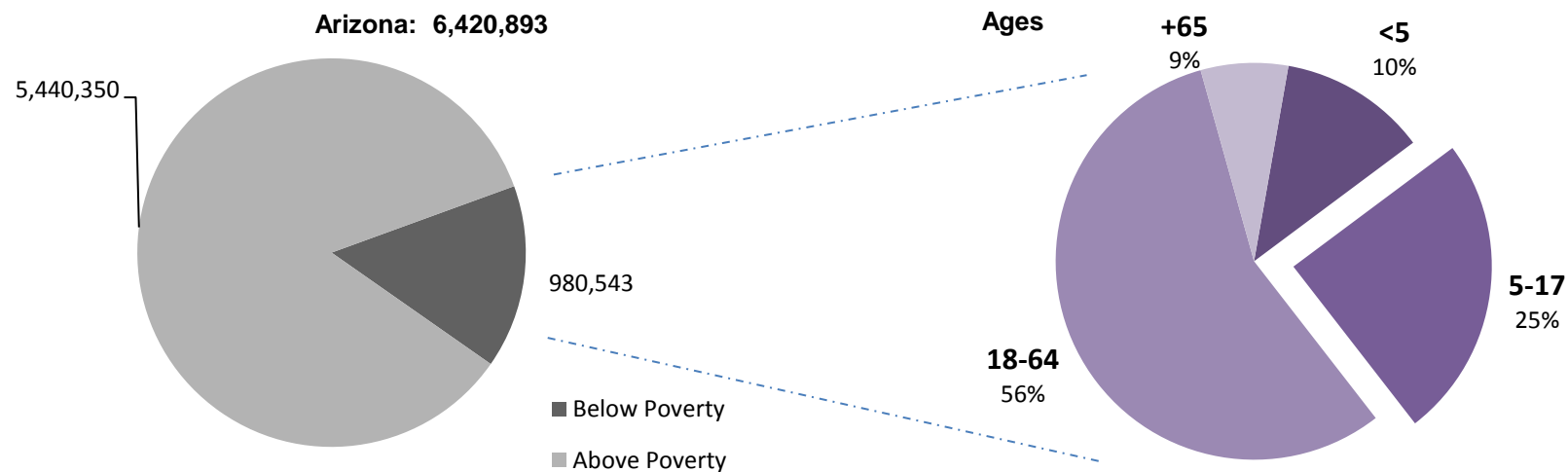
This customizable economic model uses authoritative data elements to calculate the social and economic benefits of Digital Inclusion



A PC+Broadband bundle creates an average of \$1.2M in economic and social impact for a student over the course of their lifetime



Empowering Students with a home PC+Broadband increases their chance of graduating from high school by 6-8 ppt. The overwhelming majority of children in poverty lack this basic access



According to a study published by the US Federal Reserve Bank in 2008, empowering school-age children with a PC+Broadband increases the probability of that child graduating from high school between 6-8 ppt¹

¹Note: <https://federalreserve.gov/pubs/ifdp/2008/958/ifdp958.htm>

Targeting disadvantaged students is critical because they have:

- Higher likelihood of no home PC+Broadband access
- Low high school graduation rate compared to non-disadvantaged population

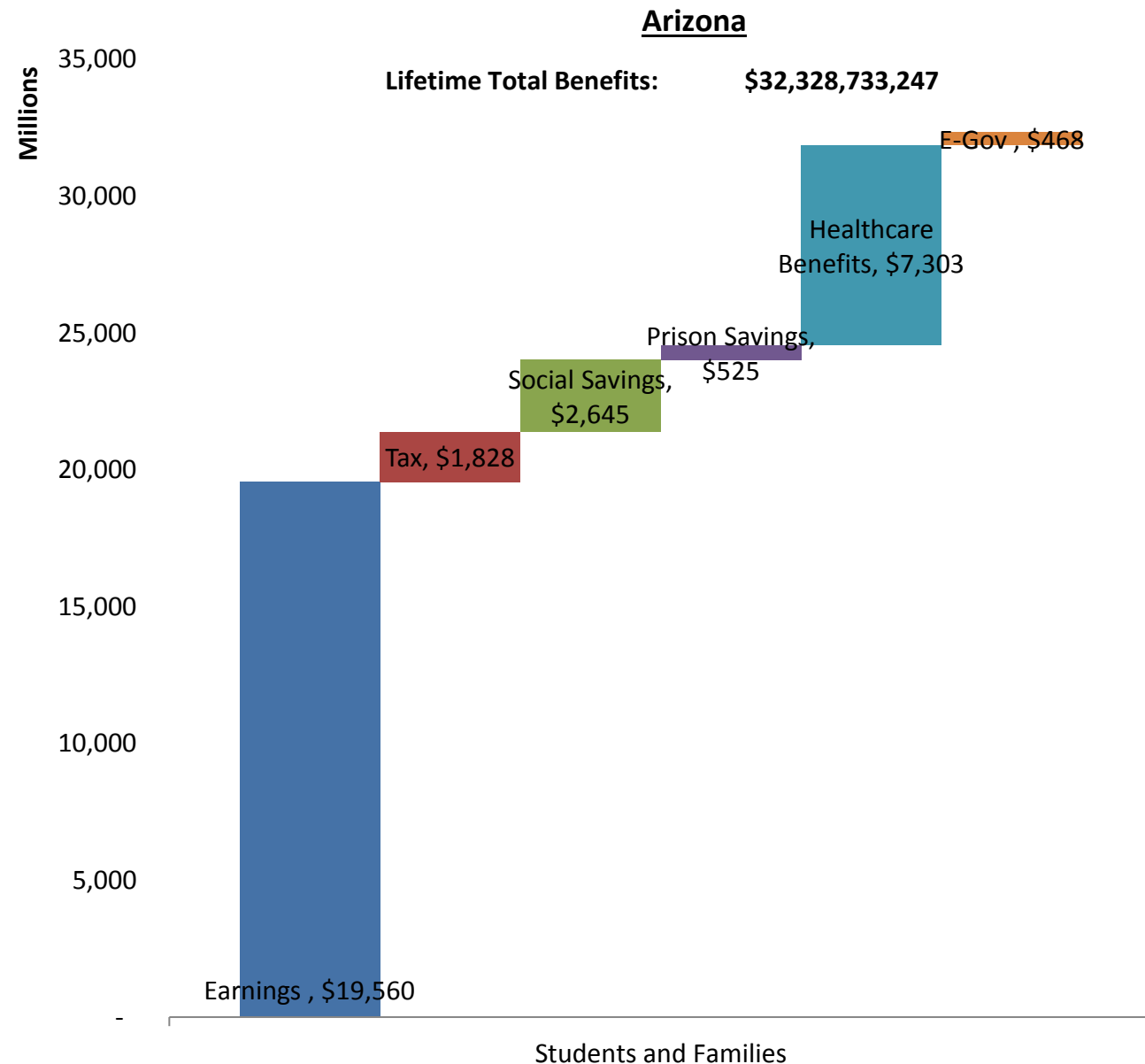
Demographics

Year	2011
Arizona:	6,420,893
Below Poverty	980,543
<5	117,919
5-17	242,103
18-64	550,670
+65	69,852
Above Poverty	5,440,350
<5	360,647
5-17	946,988
18-64	3,338,611
+65	794,103

By targeting students in poverty, over ~\$32.3B in total economic and social impact can potentially be realized

Key Assumptions	
Solution Approach	All Households
Benefit Recipients	Students and Families
Recipient Population Below Poverty	980,543
Recipient Population 5-17 Below Poverty	242,103
# of PC+Broadband Required	783,831
Average High School Graduation Rate	75%
Average percentage of students pursuing higher education	54%
Income Tax Rate	3.4%
Sales Tax Rate	6.6%
Property Tax Rate	1.0%
Overall Gov't Social Program Budget	\$ 5,622,012,067
Number of prison inmates	40,130
The average cost of maintaining one prisoner for one year in prison	\$ 22,166
Gov't health programs spending	\$ 36,349,000,000
e-Gov Amount saved per online transaction	\$ 5.60

Model results based on assumptions presented in Key Parameter Values

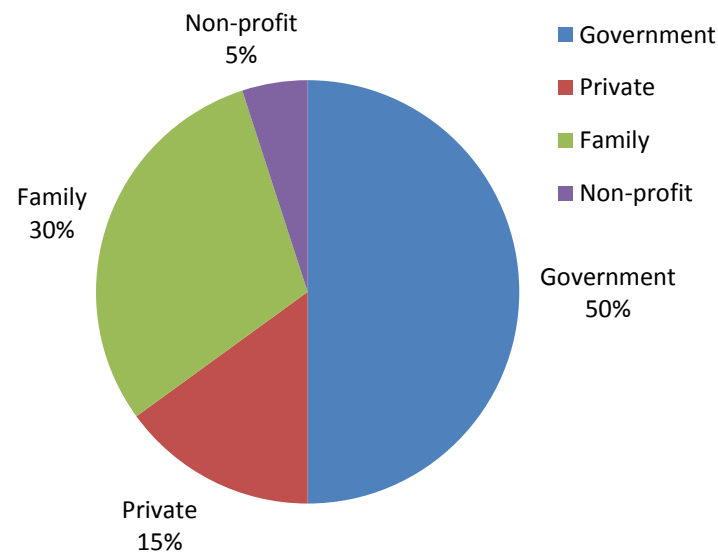


For example, if the Gov't contributed 50% of the solution cost, there would be a 403% ROI over 3 Years

Example Solution			
PC+Broadband Solution Costs			
Item	Cost	Recurring	Total
Connectivity	\$ 10	36	\$ 360
Device	\$ 250	1	\$ 250
Training and Support	\$ 70	1	\$ 70
			\$ -
Total			\$ 680

Total Solution		
Audience	# of households/student	Gov't, Participants, Industry Investments
All Households	783,831	\$ 533,005,067
Total	783,831	\$ 533,005,067

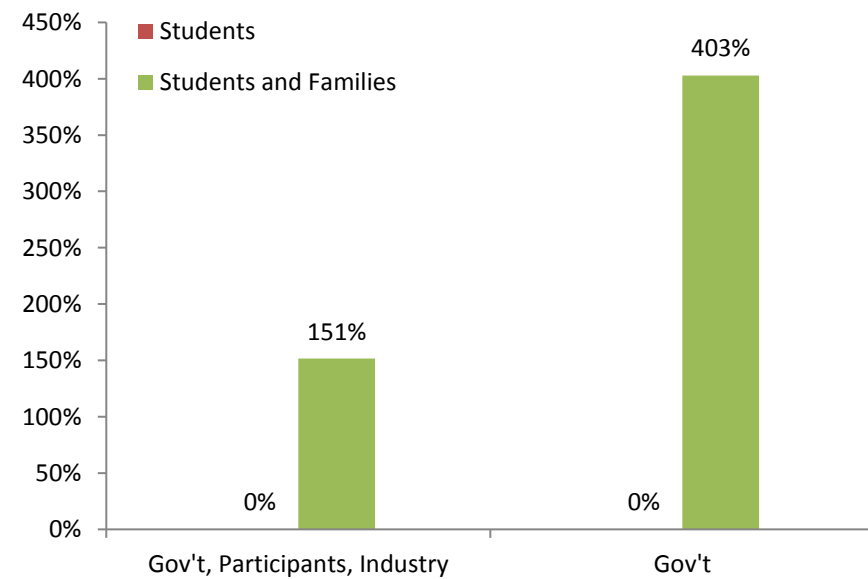
Total Program Cost \$533,005,067



Solution Approach:
All Households

Arizona

ROI period: 3 Years



Notes:

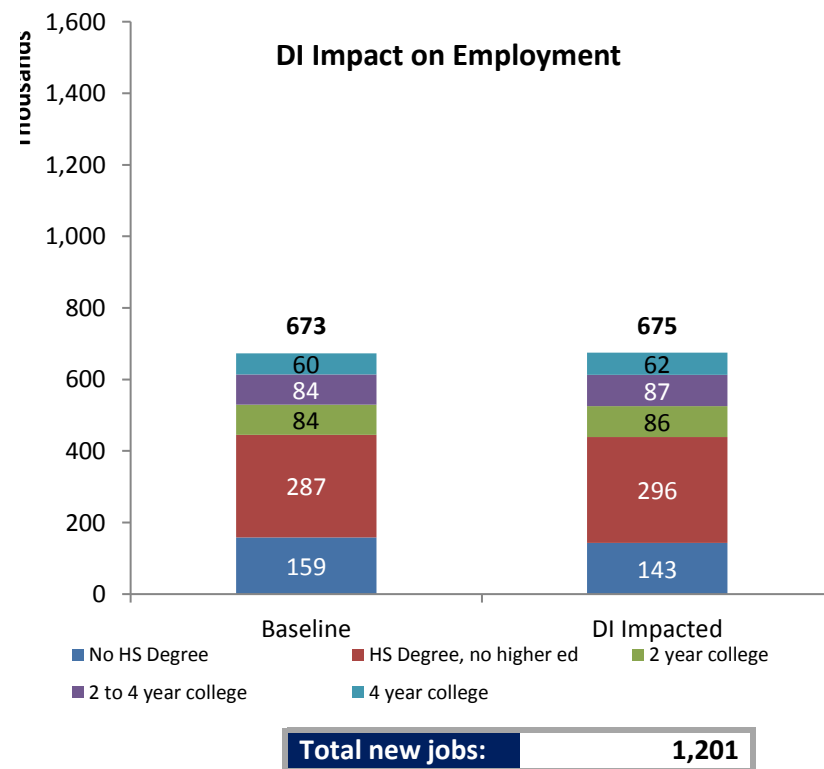
Project ROI are calculated based on a number of variables

- ROI by 'students' or by 'students and families'
- ROI by 'gov't, participants, industry' or 'state only'
- ROI by user selected time horizon: 2,3,4 or 5 years
- ROI based on lifetime benefits are meaningless, for practical purposes, a time horizon of 3-5 years best represents the true economics value of a project

Annual benefits are discounted back to Present Value using 30 year municipal/general bond discount rates

For each ROI time horizon calculation, benefits account for only the number of students that will be graduating high school within that time horizon

Finally, affected individuals will have more employment opportunities, benefiting from the lifetime creation of 1201 jobs


Gov't Facts and Assumptions
Unemployment rate

No High School Degree	14.9%
HS Degree Only	10.3%
2 year college	7.0%
2-4 year college	5.4%
4 year college	5.4%

Labor Force Participation Rate	82.2%
--------------------------------	-------

Unemployment rate reduction

5-17	0.2%
0-64	0.1%

Appendix

Background on the Digital Divide and the imperative for Digital Inclusion

Worldwide, countries have committed to improving access to quality education as a critical part of improving their economies and societies. Technology access for students, teachers and parents has been identified as a critical enabler that makes it possible for anyone, anywhere to get a top quality education. For all citizens, access to this 'digital society' delivers tangible economic, employment and social opportunities. For governments, increasing digital inclusion accelerates the growth of a high-employment economy by accelerating global competitiveness. Public/Private Partnerships (PPPs) can create meaningful and effective solutions to these educational, economic and social challenges by **making technology access a right for all, not a privilege for some.**

The United States has become a fundamentally digital place. However, it is not the world's leader in the number of internet users. The global leader in terms of total users is China with 389M connected users compared to 245M in the US. In order to maintain competitiveness, the US must bridge its digital divide. **For most of us, life without internet access is unimaginable.** A computer is critical for basic tasks such as writing resumes, completing school assignments, contacting friends and colleagues, searching for information and shopping. For digital citizens, the internet is a portal to crucial information about current events, job opportunities, government and social services, health and wellness and myriad other topics. Yet these tools for living are by no means universally available. Constrained by cost, a significant number of disadvantaged citizens are missing out on the basic tools that engender participation in modern life. This 'digital divide' has a significant, negative impact on the communities it affects, by limiting their access to information, employment and social networks. This ultimately negatively affects our local and overall global competitiveness.

On the upside, however, bridging this divide has genuine, measurable benefits for individuals and the broader community. This economic model demonstrates the scale of these benefits, and makes a strong case for expanding the process of 'digital inclusion' to other disadvantaged areas of United States. There are approximately 14.3% of Americans are below poverty level in 2010. This means their income is below \$22,162 for a family of 4. **The majority of these individuals and their households do not have regular internet access.** This is primarily attributed to three main factors: 1) having a PC and broadband internet access is cost prohibitive, they cannot afford it; 2) most individuals in this demographic do not have the right skills to use it; and 3) many do not understand the benefits of having a PC and broadband access. These obstacles perpetuate the digital divide by limiting this demographics' access to information, employment and social networks and reinforces a vicious cycle of low level of education, underemployment, and reliance on social welfare programs.

Digital inclusion is a chance for governments, communities and individual citizens to shape their future and create new jobs, opportunities for innovation and economic growth.

"...14.3% of Americans are below poverty"

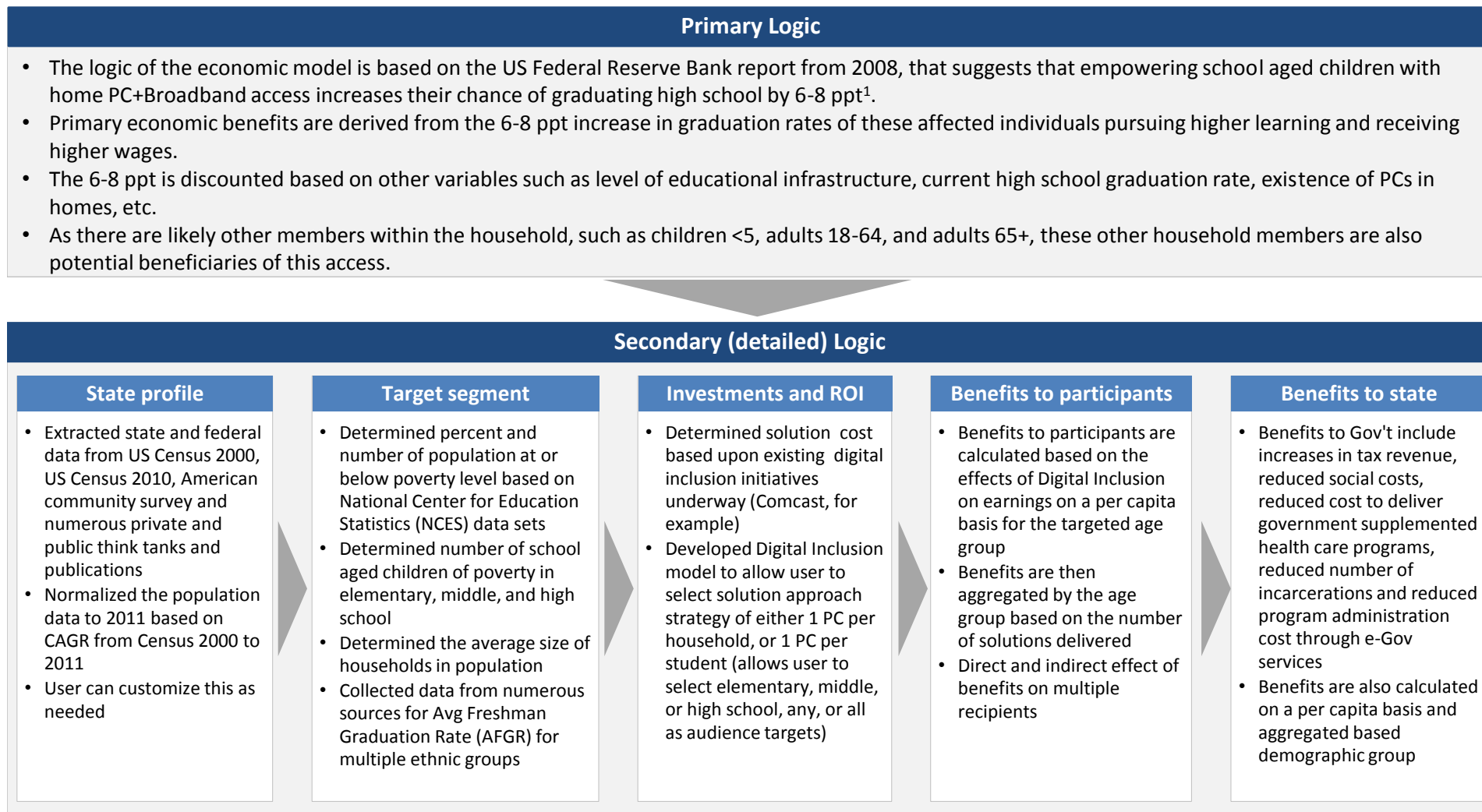
Most do not have regular internet access – they miss out on current events, job opportunities, government and social services, and health and wellness benefits

"...PC and broadband internet access increase their chance of graduating high school by 6-8 ppt"

60% of high school graduates will go on to higher learning institutions; a person with a college degree has a \$1M lifetime earnings benefit over someone who does not

Gov't leaders can help to break this cycle by ensuring all students and their families have home access to a computer connected to the internet

Details on the approach to developing the 'benefits of digital inclusion' tool



¹Note: <https://federalreserve.gov/pubs/ifdp/2008/958/ifdp958.htm>

Key parameter values - Arizona

Parameter	Current Value	Default Value	Default?
Earnings Benefits			
Population Below Poverty	933,113	933,113	yes
Average High School Graduation Rate	75%	75%	yes
Average percentage of students pursuing higher education	54%	54%	yes
Tax Benefits			
Standard deduction	\$ 4,677	\$ 4,677	yes
Income Tax Rate	3%	3%	yes
Sales Tax Rate	6.60%	6.60%	yes
Property Tax Rate	1.0%	1.0%	yes
Social Program Benefits			
Overall Gov't Social Program Budget	\$ 5,622,012,067	\$ 5,622,012,067	yes
Benefits % to poverty group	60%	60%	yes
Fixed cost %	40%	40%	yes
Prison Cost Reduction Benefits			
The average cost of maintaining one prisoner for one year in prison	\$ 22,166	\$ 22,166	yes
Number of prison inmates	40,130	40,130	yes
% of population from poverty	60%	60%	yes
Health Care Benefits			
e-Health savings benefits	\$ 217	\$ 217	yes
% of BB users consuming eHealth services	35%	35%	yes
Gov't health programs spending	\$ 36,349,000,000	\$ 36,349,000,000	yes
Benefits % to poverty group	60%	60%	yes
Fixed cost %	80%	80%	yes
E-Government Benefits			
Amount saved per online transaction	\$ 5.60	\$ 5.60	yes
Number of Transactions per month	1	1	yes
% of BB users transacting with e-Gov services	33%	33%	yes

A student graduating from High School who continues to pursue a 4-year degree has a significantly higher earnings potential over a student who does not

Lifetime Benefits	
Cumulative Lifetime Benefits for Gov't - Arizona	\$ 19,559,620,778
Lifetime benefits target segment per capita	\$ 33,041
Lifetime benefits by poverty demographic per capita	\$ 19,948

Average Annual Benefits	
Average Annual Gov't Benefits - Arizona	\$ 456,588,282
Average annual benefits per capita	\$ 771.28
Average annual benefits by poverty demographic per capita	\$ 465.65

Gov't Facts and Assumptions	
Population Below Poverty	980,543
Average High School Graduation Rate	75.08%
Average percentage of students pursuing higher education	53.50%

Notes:

- Earnings benefits are calculated for each demographic based on the effects of digital inclusion on the incremental high school graduate number
- The tool accounts for variable such as percentage of students graduating high school then going on to higher learning institutions, including: 2 year college (vocational/community), 2 year transferring to a 4 year college, and 4 year colleges
- The tool accounts for college attrition rate where a percent of the demographic pursuing higher-ed drop out as well as for a percent of the population who choose not to go on to higher-ed
- Specific benefits are calculated based on the increase in wages of the affected population receiving higher paying jobs made possible by achieving their high level degrees

Lifelong incremental earning translates into additional tax revenue for the Government

Lifetime Benefits	
Cumulative Lifetime Benefits for Gov't - Arizona	\$ 1,828,111,126
Lifetime benefits target segment per capita	\$ 3,088
Lifetime benefits by poverty demographic per capita	\$ 1,864

Gov't Facts and Assumptions	
Standard deduction	4,677
Income Tax Rate	3.4%
Sales Tax Rate	6.60%
Property Tax Rate	1.0%

Average Annual Benefits	
Average Annual Gov't Benefits - Arizona	\$ 42,674,351
Average annual benefits per capita	\$ 72.09
Average annual benefits by poverty demographic per capita	\$ 43.52

Notes:

- Tax revenue benefit is based on the incremental earnings benefits and is comprised of income tax, sales tax, and property tax
- Income tax is adjusted for standard deductions then multiplied by the local income tax rate
- Sales tax is based on discretionary purchases from incremental income left after paying all taxes and acquiring higher-cost housing
- Property tax is based on buying/renting more expensive housing with part of earned incremental income

As wages increase, the dependency on Gov't social and entitlement programs decreases

Lifetime Benefits	
Cumulative Lifetime Benefits for Gov't - Arizona	\$ 2,644,660,084
Lifetime benefits target segment per capita	\$ 2,861
Lifetime benefits by poverty demographic per capita	\$ 2,697

Gov't Facts and Assumptions	
Overall Gov't Social Program Budget	5,622,012,067
Benefits % to poverty group	60%
Fixed cost %	40%

Average Annual Benefits	
Average Annual Gov't Benefits - Arizona	\$ 60,105,911
Average annual benefits per capita	\$ 65.02
Average annual benefits by poverty demographic per capita	\$ 61.30

Notes:

- Social program benefits are based on the total gov't social programs budget reduced by the variable portion of spending consumed by the affected population
- These programs include: Temporary Assistance to Needy Families (TANF), Food Stamps, Child Care Assistance, Rental Housing Support Programs, etc.
- The tool allocates a percent of the total benefits going to the poverty demographic
- The tool then allocates the spending to each demographic group based on demographic distribution
- Estimated fixed vs. variable cost of program
- Applied the digital inclusion high school graduation effect percentage to each demographic group to derive the cost reduction

Citizens with adequate income, college education, and opportunities to improve their earning potential are less likely to commit crimes which impacts incarceration rates

Lifetime Benefits	
Cumulative Lifetime Benefits for Gov't - Arizona	\$ 524,945,056
Lifetime benefits target segment per capita	\$ 567.89
Lifetime benefits by poverty demographic per capita	\$ 535.36

Average Annual Benefits	
Average Annual Gov't Benefits - Arizona	\$ 11,169,044
Average annual benefits per capita	\$ 12.08
Average annual benefits by poverty demographic per capita	\$ 11.39

Gov't Facts and Assumptions	
The average cost of maintaining one prisoner for one year in prison	22,166
Number of prison inmates	40,130
% of population from poverty	60%

Notes:

- The prison cost reduction logic is based on the premise that that if a student graduates from high school and pursues higher education, he or she will be less likely to commit crimes as adult that would result in incarceration
- Benefits (cost avoidance) = number of kids given PCs x percent of 18-64 adults that commit crimes x digital inclusion high school graduation effect x cost of incarceration per adult prisoner

As wages increase, capacity for an individual to proactively manage their health increases - This reduces the cost of treating diseases associated with low income demographics - These are diseases which are often expensive to treat, and are often paid for by the Gov't (i.e. obesity)

Lifetime Benefits	
Cumulative Lifetime Benefits for Gov't - Arizona	\$ 7,303,194,910
Lifetime benefits target segment per capita	\$ 7,900.61
Lifetime benefits by poverty demographic per capita	\$ 7,448.11

Average Annual Benefits	
Average Annual Gov't Benefits - Arizona	\$ 165,981,702
Average annual benefits per capita	\$ 179.56
Average annual benefits by poverty demographic per capita	\$ 169.28

Gov't Facts and Assumptions	
e-Health savings benefits	\$ 217.00
% of BB users consuming eHealth services	35%
Gov't health programs spending	\$ 36,349,000,000
Benefits % to poverty group	60%
Fixed cost %	80%

Notes:

- Healthcare benefits are based on the total gov't healthcare programs budget reduced by the variable portion of spending consumed by the affected population
- The tool allocates a percent of the total benefits going to the poverty demographic
- The tool then allocates the spending to each demographic group based on demographic distribution
- Estimated fixed vs. variable cost of program is considered and calculated for
- The tool applies the digital inclusion high school graduation effect percentage to each demographic group to derive the cost reduction
- As a baseline, the state of Kentucky conducted a study which estimated that 35% of families realize savings of \$217 per year when accessing their health care information online
- This benefit is calculated based on the number of households with new PC multiplied by \$217 per year multiplied by 35% - which is customizable by the user to reflect actual or anticipated local impact

Shifting some basic Gov't transactions from in-person to online saves the the Gov't and tax payers an average of \$4.50 per transaction

Lifetime Benefits	
Cumulative Lifetime Benefits for Gov't - Arizona	\$ 468,201,294
Lifetime benefits target segment per capita	\$ 506.50
Lifetime benefits by poverty demographic per capita	\$ 477.49

Gov't Facts and Assumptions	
Amount saved per online transaction	\$ 5.60
Number of Transactions per month	1.00
% of BB users transacting with e-Gov services	33.0%

Average Annual Benefits	
Average Annual Gov't Benefits - Arizona	\$ 10,640,938
Average annual benefits per capita	\$ 11.51
Average annual benefits by poverty demographic per capita	\$ 10.85

Notes:

- E-Consult and the Digital Impact Group published a study in 2010 that estimated the average cost savings of a government transaction done virtually is \$4.50
- Model assumes that each citizen engages in roughly 1 of these transaction per month - and the tool allows for customization to reflect actual or anticipated local use
- The tool estimates that of households offered PCs, 33% will migrate to performing 1 additional transaction online - and the tool allows for customization to reflect actual or anticipated local use

Data and Sources

Bibliography - 1

<http://technologyforhumanity.net/articles/lowincome.html>
http://wiki.answers.com/Q/Average_salary_of_a_college_graduate_versus_a_high_school
<http://sites.google.com/site/nathanmarting/dropout-vs-graduate-salaries>
<http://www.higheredinfo.org/dbrowser/index.php?measure=23>
<http://www.bls.gov/web/laus/laumstrk.htm>
<https://federalreserve.gov/pubs/ifdp/2008/958/ifdp958.htm>
http://wiki.answers.com/Q/What_percentage_of_high_school_graduates_go_to_college_2008-2009
<http://www.stanford.edu/group/bridgeproject/execsummary.html>
<http://news.medill.northwestern.edu/chicago/news.aspx?id=150731>
<http://www.brighthub.com/education/college/articles/82378.aspx>
<http://www.iccb.org/facts.html>
<http://blogs.wsj.com/economics/2010/07/07/fewer-low-income-students-going-to-college/>
<http://nces.ed.gov/programs/stateprofiles/sresult.asp?mode=full&displaycat=1&s1=17>
<http://nces.ed.gov/ccd/bat/>
http://www.ehow.com/how_5967963_internet-low-income-families.html
<http://www.census.gov/hhes/www/poverty/about/overview/measure.html>
http://en.wikipedia.org/wiki/Disadvantaged#Economically_disadvantaged
<http://dpi.wi.gov/lbstat/dataecon.html>
<http://aspe.hhs.gov/poverty/faq.shtml#programs>
http://www.mitpressjournals.org/doi/pdf/10.1162/DAED_a_00019
<http://www.npr.org/templates/story/story.php?storyId=130647626>
<http://nces.ed.gov/fastfacts/display.asp?id=51>
<http://nces.ed.gov/programs/coe/2010/section3/indicator20.asp>
http://factfinder.census.gov/servlet/ACSSAFFPeople?_event=&geo_id=04000US17&geoContext=01000US%7C04000US17&street=&county=&cityTown=&state=04000US17&zip=&lang=en&sse=on&ActiveGeoDiv=&useEV=&pctxt=fph&pgsl=040&submenuId=people_9&ds_name=null&ci_nbr=null&qtr_name=null®=null%3Anull&keyword=&industry=
<http://www.bls.gov/news.release/hsgec.nr0.htm>
<http://www.ojjdp.gov/ojstatbb/offenders/faqs.asp>

Bibliography - 2

[http://www.acenet.edu/AM/Template.cfm?Section=GED_TS&CFID=429286&CFTOKEN=75355487&jsessionid=1630c7dcf41bM\\$3F\\$2D\\$](http://www.acenet.edu/AM/Template.cfm?Section=GED_TS&CFID=429286&CFTOKEN=75355487&jsessionid=1630c7dcf41bM$3F$2D$)
http://www.acenet.edu/Content/NavigationMenu/ged/pubs/GED_ASR_2008.pdf
http://en.wikipedia.org/wiki/Incarceration_in_the_United_States
http://en.wikipedia.org/wiki/United_States_Budget
<http://www.internetinnovation.org/factbook/category/poverty/>
<http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>
<http://www.census.gov/population/www/socdemo/hh-fam/cps2010.html>
http://connectednation.com/documents/Connected_Nation_EIS_Study_Full_Report_02212008.pdf
<http://www.digitalimpactgroup.org/costofexclusion.pdf>
http://factfinder.census.gov/servlet/STTable?_bm=y&-geo_id=01000US&-qr_name=ACS_2008_3YR_G00_S1701&-ds_name=ACS_2008_3YR_G00
<ftp://ftp.bls.gov/pub/special.requests/cpi/cpiat.txt>
http://www.bls.gov/emp/ep_chart_001.htm
http://www.bls.gov/emp/ep_data_labor_force.htm
<http://www.bls.gov/cps/cpsaat3.pdf>
<http://www.bea.gov/newsreleases/national/pi/pinewsrelease.htm>
<http://www.census.gov/hhes/www/housing/ahs/ahsfaq.html>
<http://www.mass.gov/dor/>
<http://www.statehealthfacts.org/profileind.jsp?cat=5&sub=65&rgn=4>
Arizona Department of Economic Security Annual Report, 2010-11
<http://arizonaindicators.org/criminal-justice/correction>
<http://measuringup.highereducation.org/docs/2006/statereports/AZ06.pdf>
<https://www.azed.gov/wp-content/uploads/PDF/2009GRstateethnicity.pdf>
<http://arizonaindicators.org/education/high-school-graduation-rates>
http://www.eastvalleytribune.com/opinion/article_16c0cb94-956e-11e1-b026-0019bb2963f4.html
http://trends.collegeboard.org/downloads/education_pays/PDF/Education_Pays_2010_College_Enrollment_Rates_by_State.pdf